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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,426	10/03/2003	Ira Liao	3304.2.92	1590
21552	7590	07/13/2007		
MADSON & AUSTIN GATEWAY TOWER WEST SUITE 900 15 WEST SOUTH TEMPLE SALT LAKE CITY, UT 84101			EXAMINER SMITH, JEFFREY S	
			ART UNIT 2624	PAPER NUMBER
			MAIL DATE 07/13/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/678,426	LIAO ET AL.	
	Examiner	Art Unit	
	Jeffrey S. Smith	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14, 17, 19-25, 27 and 30-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 17, 19-25, 27 and 30-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☐ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413) |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) ☐ Information Disclosure Statement(s) (PTO/SB/08) | 5) ☐ Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) ☐ Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14, 17, 19-25, 27, and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,739,861 issued to Music ("Music") in view of U.S. Patent Number 7,050,639 issued to Barnes et al. ("Barnes").

For claim 1, Music recites "operating a first and a second data to take a difference between the values of said first and said second data" (see column 2 lines 30-34, which discuss a difference dU between a pixel U and a previous pixel U . See also column 3 lines 40-44, which disclose U and V differentials, and column 5 lines 49-50 which discloses subtraction of the luminosity of adjacent pixels). Barnes also discloses this feature in figure 5 and columns 7 and 9.

Claim 1 further recites "encoding said difference into a first recovery data code having a bit number less than m when the absolute value of said difference is less than a first threshold; encoding said difference into a second recovery data code having a bit number equal to m when the absolute value of said difference is no less than said first threshold but no greater than a second threshold." Figure 5A of the drawings as originally filed shows an example of the first and second thresholds and the first and

second recovery data code. As shown in Figure 5A, the first threshold is 8 and the second threshold is 15. When the difference is less than +8 and greater than -8 (in other words, the absolute value of the difference is less than 8), the first recovery data code is used, which is a code having less than 7 bits. When the absolute value of the difference is not less than 8 but not greater than 15, the second recovery data code is used, which is a code having seven bits.

The thresholds and the recovery data codes as shown in figure 5A of the application as originally filed are an example of a traditional Huffman code that has been well known since at least 1968. The traditional Huffman code is shown by Music in column 3 and column 7.

For example, as shown in column 3 of Music, when the absolute value of the difference is less than a first threshold such as 13, the first recovery data code is used, which is a code having less than 7 bits. When the absolute value of the difference is not less than 13 and not greater than a second threshold such as 54, the second data recovery code is used, which is a code having seven bits. As another example, as shown in column 7 of Music, when the absolute value of the difference is less than a first threshold such as 59, a first recovery data code having less than 5 bits is used. When the absolute value of the difference is not less than 59 and not greater than a second threshold such as 76, a second recovery data code having five bits is used.

Therefore, Music discloses "encoding said difference into a first recovery data code having a bit number less than m when the absolute value of said difference is less than a first threshold; encoding said difference into a second recovery data code having

a bit number equal to m when the absolute value of said difference is no less than said first threshold but no greater than a second threshold” as shown in columns 3 and 7.

Barnes also discloses “encoding said difference into a first recovery data code having a bit number less than m when the absolute value of said difference is less than a first threshold; encoding said difference into a second recovery data code having a bit number equal to m when the absolute value of said difference is no less than said first threshold but no greater than a second threshold.” For example, as shown in figure 7 of Barnes, when the absolute value of the difference is less than a first threshold, such as 128, a first recovery data code having less than 17 bits is used. When the absolute value of the difference is no less than 128 and no greater than a second threshold, such as 255, a second recovery data code having 17 bits is used.

Claim 1 further recites “encoding said difference into a third recovery data code divided by said difference when the absolute value of said difference is greater than said second threshold.” Barnes discloses that when the absolute value of the difference shown in figure 7 is greater than a predetermined threshold, the value of the difference is not mapped to a huffman code extension. Barnes does not disclose dividing the difference. Music discloses that when accuracy is not of prime importance, the number of bits that represent a value can be reduced by truncating the least significant bit, which is the value divided by 2.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify Music to stop mapping the value of the difference to a huffman code when the value of the difference exceeds Music's second threshold as taught by Barnes

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in figure 7. It also would have been obvious to reduce the bit size of the difference by truncating the last bit when accuracy is not of prime importance as taught by Music in column 8 lines 61 through 67.

For claim 2, Music discloses luma values of two immediately adjacent pixels (see column 6 lines 10-12).

For claim 3, Music discloses chroma values of two immediately adjacent pixels (see column 2 lines 31-32).

For claim 4, the bit number of the absolute value of the difference is equal to m and a bit number of said third recovery data code is equal to m is interpreted as meaning that additional bits are added to the bit number of the absolute value of the difference until the bit number is equal to m . For example, when the difference is 16, the bit number is 5. When this number is divided by 2, the bit number is 4, so an additional 4 bits need to be added to bring the bit number up to 8. Therefore at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have a bit number of the third recovery code equal to m when a number of the absolute value of the difference is equal to m by adding leading zeros to bring the bit number up to m as shown by figure 7 of Barnes and column 3 of Music. Furthermore, applicant has not disclosed that having a bit number equal to m as opposed to $m+1$ or $m-1$ or any other number provides an advantage, is used for a particular purpose or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with the bit numbers in the codes of Music, Barnes, or m , because each code performs the same function of compression equally well

considering the typical size of image data. Therefore, it would have been obvious to one of ordinary skill in this art to modify the code of Music and Barnes to obtain the invention as specified in claim 4.

For claim 5, Music has the bit number of the first code that varies with the difference (see column 3 lines 50-62).

For claim 6, Music has a tag bit representing the sign of the difference (see the most significant bit in column 7 lines 6-12).

For claim 7 Music has a third recovery code that corresponds to the difference, which ipso facto corresponds to half of the difference. Barnes has a third recovery code that corresponds to the difference, which by definition corresponds to half the difference.

For claim 8, Music has correlation tables for the first and second recovery data codes as shown in columns 6 and 7. Barnes in figures 7-12 has correlation codes.

For claim 9, Music has operating (column 2 lines 30-34), encoding said difference into a first recovery data code (column 6 lines 45-50), encoding said difference into a second recovery data code (column 6 lines 55-63), and encoding said second data into a third recovery data code when the absolute value of said difference is greater than said second threshold (see column 6 line 24). Music also has first, second and third codes as shown in column 3 and column 7. Barnes also discloses "encoding said difference into a first recovery data code having a bit number less than m when the absolute value of said difference is less than a first threshold; encoding said difference into a second recovery data code having a bit number equal to m when the

absolute value of said difference is no less than said first threshold but no greater than a second threshold.” For example, as shown in figure 7 of Barnes, when the absolute value of the difference is less than a first threshold, such as 128, a first recovery data code having less than 17 bits is used. When the absolute value of the difference is no less than 128 and no greater than a second threshold, such as 255, a second recovery data code having 17 bits is used.

Barnes also discloses “and encoding said second data into a third recovery data code when the absolute value of said difference is greater than said second threshold.” When the absolute value of the difference shown in figure 7 is greater than 255, a third recovery data code having 19 bits is used. The third data recovery code is the second data when the absolute value of the difference exceeds 511.

Music discloses truncating the end bit in col. 8 and Barnes discloses grafting a designated bit as a leading bit of the third recovery code (see figure 13 where 202 is the third recovery code which includes designated bits 214 and compression code 216. Barnes uses two bits rather than one as the designated bits because he uses several compression codes as shown in figures 7-12. However, when only using two codes (where the first and second codes of claim 9 are really one standard huffman code and the third code is the actual value), then obviously only one designated bit is needed to distinguish the huffman code from the non-huffman code).

For claim 10, Music discloses the luma values at column 6 lines 10-12.

For claim 11, Music discloses the chroma values at column 2 lines 31-32.

For claim 12, Music discloses that the bit number varies with the difference (column 3 lines 50-62).

For claim 13, Music has the tag bit (see column 7 lines 6-12).

For claim 14, Music has a third recovery data code equal to m (where $m=7$, see column 3 lines 23 and 61).

For claims 17 and 19-20, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a characteristic bit of "1" to represent the huffman codes and a leading bit of "0" to represent the non-huffman codes for the benefit of allowing the decoder to distinguish the quantized third code from the differential first and second codes as taught by Barnes in element 214 of figure 13.

For claim 21, the data compressing method of claim 8 is used by a data decompressing method as discussed in columns 1 and 2.

For claim 22, Music shows in Figure 1 a first data register (11 or 16) for storing first and second data, an encoder (14) to obtain a difference, an encoder (15) to encode the difference into length variable recovery data code in a first condition, a first constant length code in a second condition, and a second constant length data code in a third condition (see column 3 lines 45-66). Barnes also discloses encoding said difference into a length-variable recovery data code having a bit number less than m when the absolute value of said difference is less than a first threshold; encoding said difference into a first constant-length recovery data code having a bit number equal to m when the absolute value of said difference is no less than said first threshold but no greater than a second threshold. For example, as shown in figure 7 of Barnes, when the absolute

value of the difference is less than a first threshold, such as 128, a length-variable recovery data code having less than 17 bits is used. When the absolute value of the difference is no less than 128 and no greater than a second threshold, such as 255, a first constant-length recovery data code having 17 bits is used.

Barnes also discloses "and encoding said difference into a second constant-length recovery data code proportional to said difference in a third condition of said difference." When the absolute value of the difference shown in figure 7 is greater than 255, a third recovery data code having 19 bits is used. The third data recovery code is proportional to the difference because the Huffman code prefix and the code extension indicate the actual value of the difference. Encoding the difference into a second constant length recovery code by dividing the difference is obvious based on Music in view of Barnes as discussed in the rejection of claim 1.

For claim 23, Music discloses the first condition holds when the absolute values is less than a first threshold, the second condition holds between a first and second threshold, and the third condition holds when the difference is greater than the third threshold (see column 3 lines 18-24).

For claim 24, Music has a bit number for the first and second data equal to m .

For claim 25, the variable length code is less than m , and the constant length codes are equal to m , as shown in column 3.

For claim 27, which relate to the decoding features, Music has designed the encoding system to function with a decoding system as discussed in columns 1 and 2.

For claim 30, Music has a differential pulse encoding modulator (see the title).

For claim 31, Music has the data registers as discussed above. Barnes discloses a data compressing and decompressing device for use with an image pickup device and a frame buffer, comprises: a first data register in communication with the image pickup device for storing therein a first and a second data outputted by the image pickup device (figure 1 file server 18); a first encoder in communication with said first data register, operating said first and said second data to obtain a difference between values of said first and said second data (compression/decompression interface 20 and figure 6 step 290); and a second encoder in communication with said first encoder and said frame buffer, encoding said difference into a length-variable recovery data code in a first condition of said difference (figure 6 step 296 and figure 12 code extension for Huffman code prefix 00 through 11101 for the difference of ± 479), encoding said difference into a first constant-length recovery data code in a second condition of said difference (code extension for prefix 111100 through 111101 for the difference of $\pm 480 < \text{difference} < \pm 991$), and encoding said second data into a second constant-length recovery data code in a third condition of said difference (actual value for difference $> \pm 992$).

Music and Barnes teach truncating the end bit of the second data and grafting a designated bit into the second data as discussed in the rejection of claim 9.

For claim 32, which is the decompressing method for data compressed using the method of figure 31, Barnes performs the decompression of data compressed using the code shown in figure 12 using the compression/decompression interface 20.

Response to Arguments

Applicant's arguments filed June 21 2007 have been fully considered but they are not persuasive.

Applicant argues that "the difference d processed by Barnes is a difference between a predicted value and an actual value instead of data of two immediately adjacent pixels." This is wrong as discussed by Barnes in col. 9.

Applicant argues with respect to claim 4 that "Since the present compressing method intends to reduce image data amount in transmission, it doesn't make sense to encode the difference into a much longer data code." This is exactly what applicant is doing, for example, when m is 8, and the difference is 16, the value of the difference is 5 bits. When this value is divided by truncating the last bit, the difference value is 4 bits. Therefore, in order to have the third code have a bit number of m, the difference is encoded into a much longer code. Given this, the prior art shows a reasonable expectation of success.

Applicant argues that Music and Barnes "fail to disclose a leading bit of each of said first and second recovery data codes is different from a leading bit of said third recovery data code, as recited in claim 10." However, this element is not in claim 10 but is in claim 17. Barnes shows this feature in figure 13 as discussed in the rejection of 17.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

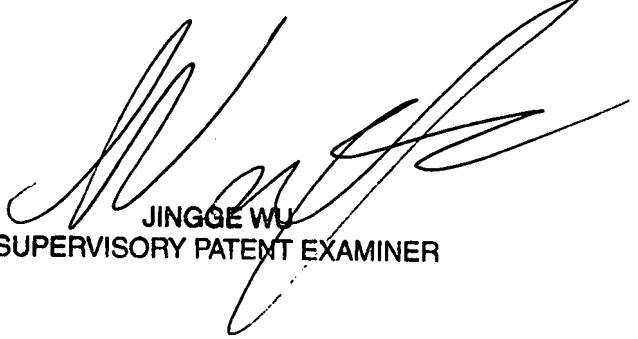
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey S. Smith whose telephone number is 571 270-1235. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JSS
July 3, 2007



JINGGE WU
SUPERVISORY PATENT EXAMINER